

The Impact of Departure Audits of Natural Resource Assets By Leading Cadres on The Financing of Heavily Polluting Enterprises

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Abstract. This paper takes the implementation of the natural resource asset departure audit of leading cadres as a quasi-natural experiment and uses the differin-differences model to explore the impact of the natural resource asset departure audit of leading cadres on the financing constraints of heavily polluting enterprises and its mechanism of action. The study found that the implementation of the natural resource asset departure audit for leading cadres significantly alleviated the financing constraints of heavily polluting enterprises; Mechanism analysis shows that the natural resource asset departure audit for leading cadres alleviates the financing constraints of heavily polluting enterprises by promoting corporate social responsibility fulfillment and improving the quality of information disclosure of heavily polluting enterprises.

Keywords: Leading cadres, natural resources, assets, departure audit; Financing constraints; Social responsibility; Quality of information disclosure.

1. Introduction

Since the 18th National Congress of the Communist Party of China, China has established the concept that "green mountains and clear waters are as valuable as mountains of gold and silver", which has become the fundamental national policy guiding China towards a green and sustainable development path. To promote the coordinated development of ecological conservation and economic growth, accelerating green development has become an inevitable path. Despite the fact that China has a history of four decades in formulating and implementing environmental protection policies, the gap between the urgent need for ecological civilization construction and the actual governance effect remains significant. To address this issue, to make up for the lack of motivation of local officials in environmental governance, and to improve the deficiencies of previous environmental regulations, the Third Plenary Session of the 18th Central Committee of the Communist Party of China formally proposed the implementation of the policy of auditing the natural resource assets of leading cadres upon their departure. This measure highlights the coordinated advancement of ecological protection and economic development, and to some extent strengthens the regulatory responsibility of governments at all levels and the environmental governance constraints of polluting enterprises. While imposing constraints on environmental governance, it is bound to affect the production and efficiency of heavily polluting enterprises. This paper analyzes the impact of departure audits of natural resource assets by leading cadres on financing constraints for heavily polluting enterprises using panel data from 2012 to 2020 using the differin-differences method.

2. Literature Review

2.1. Research on the Audit of Natural Resource Assets of Leading Cadres upon departure

The audit of natural resource assets of leading cadres is regarded as a regulatory approach, mainly highlighting its important role in promoting ecological civilization construction in the new era and building a new pattern of social governance featuring joint construction, joint governance and shared benefits. It is a necessary measure to optimize the regulatory mechanism of resources and the environment and strengthen ecological and environmental management. This article will conduct a



literature review on the impact of the natural resource asset departure audit of leading cadres on heavily polluting enterprises, with the aim of analyzing and summarizing the relevant research. The audit of natural resource assets of leading cadres is an audit activity that evaluates the policies of leading cadres in terms of environmental and economic construction, the environmental governance work during their tenure, and the follow-up investigation of environmental quality after leaving office. The natural resource asset departure audit of leading cadres is neither an economic responsibility audit nor a policy tracking type audit, nor a pure fiscal revenue and expenditure audit^[1]. The audit of natural resource assets of leading cadres, which is different from the audit of financial accounts, generates many new indicators for assessment, such as whether environmental protection and natural resource protection have been implemented and whether construction related to ecological civilization has been carried out in the place where the audited leader is located. The audit of natural resource assets of leading cadres has the characteristics of involving many aspects, deep dimensions, and high requirements for relevant knowledge. Auditors are required to have a high level of auditing quality and a certain level of comprehensive ability. The value of natural resource assets is uncertain. The departure audit of natural resource assets of leading cadres is a relatively new type of audit content, and the indicator system is not yet complete^[2]. Resource and environmental auditing is an auditing supervision carried out by auditing authorities in accordance with the concept of green development regarding the management of natural resource development and utilization and ecological and environmental protection by governments and enterprises and institutions. Resource and environmental auditing in China has evolved from nothing to something, from weak to strong, from simple to refined. In terms of scope, it has shifted from auditing a single resource element to auditing a series of all resource elements. In terms of auditing dimensions, it has changed from auditing funds to comprehensive auditing of funds, performance and responsibility. In terms of procedural mode, it has changed^[3] from special auditing to special and follow-up auditing. China's practice of resource and environmental auditing has seen new developments. Resource and environmental auditing in the new era has the following characteristics: the political nature of auditing is more prominent, the degree of legalization of auditing is higher, the penetration of auditing is stronger, the influence of auditing is greater. The following achievements have been made in resource and environmental auditing: The establishment and improvement of the system for auditing natural resource assets of leading cadres upon their departure, the more comprehensive service of resource and environmental auditing to national environmental governance, and the continuous enhancement^[4] of the international discourse power of resource and environmental auditing.

2.2. Research on the natural resource asset departure audit of leading cadres for heavily polluting enterprises

Research on the impact of policy implementation on heavily polluting enterprises has received high attention from relevant scholars. Huang found that the departure audits of natural resource assets of leading cadres can increase the level of internal environmental protection investment and green merger and acquisition expenditure of enterprises. During the audit pilot period, local governments mainly promoted the environmental governance behavior^[5] of enterprises by strengthening environmental supervision. The implementation of the audit of natural resource assets of leading cadres has an important impact on the improvement of total factor productivity of enterprises, significantly enhancing the total factor productivity^[6] of resource-based and heavily polluting listed companies. The implementation of the natural resource asset departure audit for leading cadres has significantly reduced the tax avoidance intensity of companies in resource-based and heavily polluting industries, and this effect is more prevalent in non-state-owned enterprises and enterprises in^[7] areas where local governments do not have fiscal pressure. Due to changes in the external environment for the implementation of the policy, Xiong Nianchun believes that listed companies in the pilot areas for the departure audit of natural resource assets of leading cadres have higher audit fees due to the increased intensity of environmental regulations leading to higher audit risks^[8]. Jia Qiaoyu believes that after the implementation of departure audits, resource-based and heavily polluting enterprises mainly use accounting earnings management and sales manipulation to boost

performance. Due to the increase in environmental protection investment, the cost manipulation of main enterprises has decreased instead, while the cost manipulation of products has not changed^[9] significantly because of the short-term increase in environmental protection costs. It also has an impact on green innovation and technological investment in heavily polluting enterprises. Wang Yaodong believes that the pilot areas of departure audits have a significant promoting effect on technological innovation in heavily polluting enterprises, and it is mainly reflected in the increase^[10] of strategic innovation. Huang Rongbing found through an investigation of matching data of heavily polluting enterprises on the Shanghai and Shenzhen A-share markets and the cities where the enterprises are located that the audit pilot can significantly increase the level^[11] of internal environmental protection investment and green merger and acquisition expenditure of heavily polluting enterprises.

3. Theoretical analysis and hypothesized research

National auditing is an important aspect of the power checks and balances mechanism of national governance to examine the "ecological achievements" of the region's leading cadres and to promote the long-term development of the region's ecological environment and natural resources. Regarding the impact of the departure audit of natural resource assets of leading cadres on heavily polluting enterprises, the main audit objects of the departure audit of natural resource assets of leading cadres are Party and government leading cadres, which implements the responsibility of leading cadres for environmental protection and ecological civilization construction, enhances the importance of leading cadres to natural resource assets, and strengthens the construction of the ecological environment. Stronger supervision and inspection of pollutant emissions from local heavily polluting enterprises have made the information disclosure of heavily polluting enterprises more transparent and increased the relevant information disclosure. According to relevant research, natural resource asset departure audits have a significant positive impact on the quality of environmental information disclosure by heavily polluting and resource-based enterprises, and the dynamic effect is increasing^[12]. High-quality environmental information disclosure is not only a way to demonstrate the sustainable development potential of enterprises, but also to enhance corporate reputation and investor trust. It is also an effective way to address the imbalance of information between investors and enterprises, reducing the time cost for both sides. In this way, companies can attract capital investment at a lower cost. Audits of the natural resource assets of leading cadres have improved the quality of audit reports for high-pollution enterprises and the intensity of government supervision. High-quality audit supervision can reduce debt financing costs^[13], and the strengthening of government supervision will reduce the impact^[14] of environmental information disclosure on debt financing costs. The implementation of departure audits will also make heavily polluting enterprises more aware of environmental protection, increase their responsibility for environmental protection, and enhance their social responsibility to some extent. Zhong Tingyong believes that the departure audit of natural resource assets of leading cadres significantly promotes the fulfillment^[15] of corporate social responsibility. Zhao Liangyu believes that the disclosure of corporate social responsibility information can significantly reduce the equity financing cost and debt financing cost of enterprises, and the higher the quality of their social responsibility information disclosure, the lower^[16] the equity financing cost and debt financing cost accordingly. Based on the above analysis, the following three hypotheses can be drawn:

H1: The departure audit of natural resource assets by leading cadres alleviates the financing constraints of heavily polluting enterprises.

H2: Audits of natural resource assets of leading cadres can improve the quality of information disclosure of heavily polluting enterprises and thereby reduce their financing constraints.

H3: Departure audits of natural resource assets by leading cadres can enhance the social responsibility of heavily polluting enterprises and thereby reduce their financing constraints.

4. Research Design

4.1. Sample selection and data sources

Mining, steel, cement, electrolytic aluminum, coal, 11, metallurgy, building materials, chemical, petrochemical, pharmaceutical, light industry, textile, leather, thermal power are defined as heavy pollution industries, and other industries are defined as non-heavy pollution industries, referring to the "Catalogue of Industry Classification Management for Environmental Protection Verification of Listed Companies" issued by the Ministry of Environmental Protection. Other industries are set as the control group. The research interval from 2012 to 2020 was selected and the sample was processed as follows: (1) companies listed in 2015 and later were excluded; (2) ST and *ST companies were excluded; (3) Exclude companies with missing data; Ultimately, 6,601 observations were obtained. The data studied in this paper mainly came from the CSMAR database and WIND database. The pilot time of the natural resource asset departure audit for leading cadres was mainly obtained by searching the yearbooks and official websites of relevant provinces and cities to check the time when the natural resource asset departure audit for leading cadres was first carried out, covering all regions of the country, increasing the reliability of the data To some extent, the differences in geographical features, resource distribution, etc. among provinces and cities were excluded, and the conclusions were drawn through horizontal and vertical comparisons; Corporate Social responsibility (CSR) comes from Hexun.com.

4.2. Variable Definitions

Dependent variable

At present, the academic community mainly uses indicators such as cash-cash flow sensitivity, investment-cash flow sensitivity, KZ index, WW index, SA index, etc. to measure corporate financing constraints. Since the theoretical framework of the KZ index is relatively more complete, this paper also uses the KZ index to measure the financing constraints of enterprises. The higher the KZ, the more severe the financing constraints faced by the enterprise.

Independent variables

The time points for conducting departure audits of natural resource assets of leading cadres vary by city. If departure audits of natural resource assets of leading cadres are conducted, after=1; otherwise, 0. That is, for the experimental group, treat=1 represents heavily polluting enterprises, and for the control group, Treat=0 represents enterprises in other industries. Treatedafter is the core explained variable in this paper.

Control variables

Drawing on existing research, Controls mainly include: Asset liability ratio, Cash to total assets ratio, Roe, The ratio of total fixed assets to total assets), The share, Number of directors, and State owned enterprise;

Table 1 Variable Definitions

Variable Names	Variable symbols	Variable definitions
Explained Variables	KZ	Index $KZ = 40.662 D/A + 7.590 Cash/A - 15.518 CF/A + 6.650 Lev$ The larger the index, the more severe the corporate financing constraints
Explanatory variables	Treat	If the enterprise is the experimental group, Treat is 1; If you are in the control group, Treat 0
Explanatory variables	After	If the sample observations are in the pilot year and later, after is 1; otherwise, it is 0
Control variables	Asset liability ratio	Asset-liability ratio, total liabilities/total assets
	Cash to total assets ratio	Operating cash flow, net cash flow from operating activities/total assets
	Roe	Return on net assets, net profit/shareholders' equity
	Number of directors	Number of directors
	State owned enterprise	Property rights nature: 1 for state-owned enterprises, or 0 for otherwise
	Ratio of	The proportion of operating income to the previous period's operating income
	The ratio of total fixed assets to total assets	Fixed assets ratio, net fixed assets/total assets
	The share	The shareholding ratio of the largest shareholder
Mediating variables	CSR	The higher the total score, the better the corporate social responsibility performance.
	KV	Using the KV index to measure the quality of information disclosure Using the KV index to measure the quality of information disclosure, the lower the KV index, the higher the quality of information disclosure of listed companies.

4.3. Model Setting

Build the following difference-in-differences model for verification:

$$KZ_{i,t} = \beta_0 + \beta_1 Treat_i \times After_t + \beta_2 Controls_{i,t} + \varepsilon_{i,t} + \sigma_i + \gamma_t \quad (1)$$

Where i and t represent the listed company and the year is the dependent variable representing the financing constraint of the enterprise, and is the explanatory variable representing the control variable, $KZ_{i,t}$ which $Treat_i \times After_t$ represents the fixed effect of the year and controls for temporal heterogeneity; $Controls_{i,t}$ $\varepsilon_{i,t}$ It is a random disturbance term; σ_i Represents individual fixed effects.

(3) Mediating effect model building

Mediating variables

Selecting CSR to measure corporate social responsibility based on relevant studies (Gu Leilei and Guo Jianluan, 2020; Liu Bai, 2018)^[17, 18], the assessment system takes data from social responsibility reports and annual reports published by listed companies on the Shanghai Stock Exchange and Shenzhen Stock Exchange through their official websites, examines five aspects of shareholder

responsibility, employee responsibility, supplier, customer and consumer rights responsibility, environmental responsibility and social responsibility, and adjusts the weight ratio of the five first-level indicators according to the industry to obtain accurate scores. The higher the total score, the better the performance of corporate social responsibility. The information disclosure indicator is measured by the KV index based on relevant research (Xu Shoufu and Xu Longbing, 2015; Chen Yunsen, 2019)^[19, 20]. When companies disclose information more fully, investors' reliance on trading volume information decreases, while reliance on information disclosure increases, resulting in a reduced impact of trading volume on yield. Conversely, when information disclosure is less adequate, investors are more dependent on trading volume information and less dependent on information disclosure, which leads to trading

The impact of volume on the rate of return has increased. The impact coefficient of trading volume on yield is often referred to as the KV index, which reflects the market's reliance on trading volume information and then the degree of information disclosure by companies. The higher the KV index, the lower the quality of information disclosure by listed companies.

$$M_{it} = \beta_0 + \beta_1 \text{Treat}_i \times \text{After}_t + \beta_2 \text{Controls}_{i,t} + \varepsilon_{i,t} + \sigma_i + \gamma_t \quad (2)$$

$$KZ_{it} = \gamma_1 + \gamma_2 \text{Treat}_i \times \text{After}_t + \gamma_3 M_{it} + \gamma_4 \text{controls}_{it} + \varepsilon_{it} + \sigma_i + \gamma_t \quad (3)$$

Among them, i and t represent the enterprise and the year are dependent variables indicating the financing constraints of the enterprise, are explanatory variables, are control variables, and are mediating variables KZ_{it} , $\text{CSRTreat}_i \times \text{After}_t$ and controls_{it} , KVM_{it} , which represent the fixed effect of the year and control for temporal heterogeneity; $\gamma_t \varepsilon_{it}$ is the random disturbance term; σ_i Represents individual fixed effects.

5. Empirical analysis

Table 5.1 reports descriptive statistics of the relevant variables, with a sample size of 6,601 for the pilot. First, KZ has a mean of 1.006 and a standard deviation of 2.182, with a minimum of -9.083 and a maximum of 10.23, indicating greater financing constraints among enterprises. Secondly, there are significant differences among the control variables, indicating that there are significant differences in operating results among different enterprises.

Table 2 Descriptive Statistical Results

	(1)	(2)	(3)	(4)	(5)
Variables	Observations	Average	Variance	Minimum	Maximum
KZ	6,601	1.006	2.182	-9.083	10.23
CSR	6,601	24.08	14.99	-12.95	90.01
Asset-liability ratio	6,601	0.425	0.226	0	1.957
Cash to total assets ratio	6,601	0.135	0.107	0.000825	0.798
Return on net assets	6,601	0.0596	0.0993	-1.083	0.874
Growth in operating income	6,601	1.898	18.92	-1.683	1,295
Fixed assets ratio	6,601	0.270	0.182	3.19e-05	0.954
The shareholding ratio of the largest shareholder	6,601	36.11	15.44	0	89.99
Board members	6,601	9.632	2.451	3	26
Property rights nature	6,601	0.420	0.494	0	1
KV	6,408	0.490	0.174	0.0214	1.263

To examine the impact of departure audits of natural resource assets by leading cadres on financing constraints for heavily polluting enterprises, this paper conducts regression analysis based on a multi-period differdifferdifferenced model and uses bidirectional fixed effects for panel data regression

analysis. The regression results are shown in Table 5.2. Column (3) of Table 5.2 shows that after adding control variables and controlling for year fixed effects and time fixed effects, the audit of natural resource assets of leading cadres is negatively correlated with financing constraints of heavily polluting enterprises at 95% significance, with a differdifferation estimator of -0.111. This indicates that the implementation of the natural resource asset departure audit for leading cadres has, to some extent, played a role in suppressing sudden environmental incidents, suggesting that Hypothesis one holds true.

Table 3 Benchmark Regression Results

	(1)	(2)	(3)
Variables	KZ	KZ	KZ
Treatedafter	0.376 * * *	0.321 * * *	0.111 * *
	(0.0323)	(0.0310)	(0.0478)
Asset-liability ratio	5.240 * * *	5.080 * * *	5.023 * * *
	(0.0871)	(0.167)	(0.151)
Cash to total assets ratio	8.229 * * *	8.232 * * *	9.136 * * *
	(0.178)	(0.209)	(0.192)
Return on net assets	4.626 * * *	2.500 * * *	2.770 * * *
	(0.163)	(0.172)	(0.157)
Board members	0.0419 * * *	0.0234 * * *	0.0146 *
	(0.00669)	(0.00827)	(0.00751)
Property rights nature	0.354 * * *	0.170	0.124
	(0.0365)	(0.140)	(0.127)
Revenue growth	0.00250	0.000448	0.000707
	(0.00152)	(0.00140)	(0.00127)
Fixed assets ratio	1.726 * * *	0.0388	0.438 * *
	(0.0967)	(0.222)	(0.202)
The shareholding ratio of the largest shareholder	0.00866 * * *	0.00272	0.00697 * * *
	(0.00108)	(0.00263)	(0.00245)
Constant	1.223 * * *	0.161	0.408 * *
	(0.0912)	(0.177)	(0.162)
Enterprise fixed	N	Y	Y
Year fixed	N	N	Y
Observations	6,326	6,326	6,326
R-squared	0.666	0.793	0.831

***p<0.01,**p<0.05,*p<0.1

6. Parallel Trend test

This paper conducts a parallel trend test with fictitious time variables to examine whether the impact of departure audits of natural resource assets of leading cadres carried out at different times in various cities on financing constraints for heavily polluting enterprises is effective. Based on the time when the natural resource asset departure audits of leading cadres were carried out, data from the years before and after the start of the departure audits were selected for the parallel trend test. Sample starting year to three years before the departure audit (excluding the previous year) and three years after the departure audit. As shown in Figure 6.1, there was no significant difference in the distribution of environmental emergencies over the first three years of policy implementation, and the treatment group and the control group were somewhat comparable. With the development of policy

implementation, there is a significant increase in the reduction of financing constraints on heavily polluting enterprises, and the dispersion shows a negative correlation, hypothesis one holds.

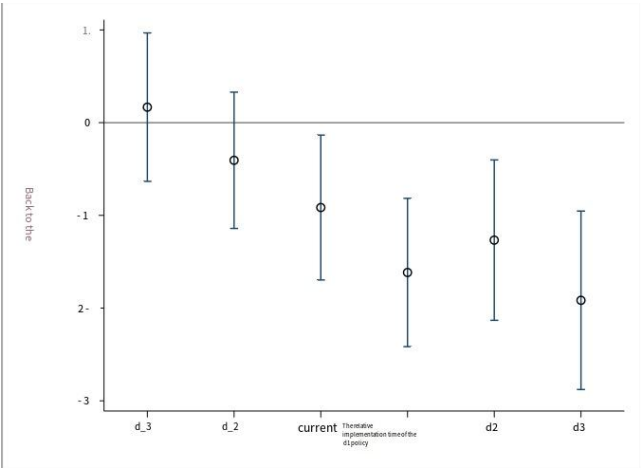


Figure 1 Parallel trend test

7. Mechanism Test

7.1. The mediating effect of corporate social responsibility

In order to explore the mechanism by which departure audits of natural resource assets of leading cadres exert financing constraints on heavily polluting enterprises and to investigate the mediating effect of corporate social responsibility, this paper conducts an analysis of the mediating effect. The regression results are shown in Table 7.1. According to the data in column (1), the departure audit of natural resource assets of leading cadres is positively correlated with corporate social responsibility at a significant level, with a differdifferences estimator of 0.997, indicating that the departure audit of natural resource assets of leading cadres increases the social responsibility of heavily polluting enterprises. As shown in column (2), the KZ of the audit of natural resources assets of leading cadres is negatively correlated with the financing constraints of heavily polluting enterprises at a significant level of -0.102, indicating that the audit of natural resources assets of leading cadres will reduce the financing constraints of heavily polluting enterprises; Corporate social responsibility is negatively correlated with financing constraints, indicating that an increase in corporate social responsibility will reduce the financing constraints of enterprises. Therefore, the hypothesis H2 holds true, that is, the departure audit of natural resource assets by leading cadres reduces the financing constraints of heavily polluting enterprises by affecting the assumption of social responsibility by enterprises.

Table 4 Analysis Table of Mediating Effects

	(1)	(1)
Variables	CSR	KZ
Treatedafter	0.997 *	0.102 * *
	(0.511)	(0.0476)
Asset-liability ratio	3.543 * * *	4.984 * * *
	(1.184)	(0.151)
CSR		0.00632 * * *
		(0.00122)
Cash to total assets ratio	3.021	9.136 * * *
	(1.979)	(0.192)
Return on net assets	42.05 * * *	2.474 * * *
	(1.679)	(0.164)
Board members	-0.0465	0.0152 * *
	(0.0805)	(0.00749)
Property rights nature	-0.0986	0.0796
	(1.375)	(0.127)
Revenue growth	-0.00932	0.000614
	(0.00737)	(0.00126)
Fixed assets ratio	4.890 * *	0.480 * *
	(2.164)	(0.203)
Shareholding ratio of the largest shareholder	0.0286	0.00680 * * *
	(0.0256)	(0.00244)
Constant	23.06 * * *	0.562 * * *
	(1.646)	(0.165)
Enterprise fixed	Y	Y
The year is fixed	Y	Y
Observations	6,578	6,303
R-squared	0.567	0.833

P < 0.01, * * * * * p < 0.05, p < 0.1

7.2. The mediating effect of information disclosure

The regression results are shown in Table 7.2. According to the data in column (1), the departure audit of natural resource assets of leading cadres is negatively correlated with the information disclosure of heavily polluting enterprises at a significant level, with a differdifferences estimator of -0.0169, indicating that the departure audit of natural resource assets of leading cadres increases the quality of information disclosure of heavily polluting enterprises. As shown in column (2), the negative correlation between the audit of natural resources assets of leading cadres and the financing constraint KZ of heavily polluting enterprises is -0.105 at a significant level, indicating that the audit of natural resources assets of leading cadres will reduce the financing constraint of heavily polluting enterprises; The quality of information disclosure of enterprises is positively correlated with financing constraints, indicating that an increase in the quality of information disclosure of enterprises will reduce financing constraints of enterprises. Therefore, it is assumed that H3 holds true, that is, the departure audit of natural resource assets by leading cadres reduces the financing constraints of heavily polluting enterprises by affecting the quality of information disclosure.

Table 5 Mediating Effects Analysis

	(1)	(1)
Variables	KV	KZ
Treatedafter	0.0169 * *	0.105 * *
	(0.00740)	(0.0477)
Asset-liability ratio	-0.0243	0.164 *
	(0.0189)	(0.0873)
KV		5.033 * * *
		(0.151)
Cash to total assets ratio	0.0457	9.177 * * *
	(0.0296)	(0.192)
Return on net assets	0.168 * * *	2.764 * * *
	(0.0243)	(0.157)
Board members	0.00473 * * *	0.0155 * *
	(0.00116)	(0.00752)
Property rights nature	0.0120	0.0759
	(0.0199)	(0.127)
Revenue growth	-0.000248	0.000734
	(0.000198)	(0.00126)
Fixed assets ratio	-0.00765	0.495 * *
	(0.0316)	(0.204)
The shareholding ratio of the largest shareholder	0.000717 *	0.00717 * * *
	(0.000380)	(0.00246)
Constant	0.470 * * *	0.346 * *
	(0.0243)	(0.168)
Enterprise fixed	Y	Y
Year fixed	Y	Y
Observations	6,408	6,295
R-squared	0.344	0.833

P < 0.01, * * * * * p < 0.05, p < 0.1

8. Conclusion

Based on the relevant information of listed companies in China from 2012 to 2020 and the pilot period of departure audits of natural resource assets of leading cadres, the multi-period DID method was used to explore the impact results and mechanism of departure audits of natural resource assets of leading cadres on financing constraints of heavily polluting enterprises. By measuring difference-in-differences estimators and based on sample research results and analysis, the final conclusion is that the natural resource asset departure audit for leading cadres carried out in China reduces the financing constraints of heavily polluting enterprises by increasing their social responsibility and the quality of information disclosure, which is of positive significance for the long-term development of heavily polluting enterprises. It has positive implications for ecological civilization construction as well.

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